ATTREX

Jet Propulsion Laboratory
California Institute of Technology

The Microwave Temperature Profiler (MTP) on ATTREX

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ATTREX Science Team Meeting
Dryden Flight Research Center
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Microwave Temperature Profiler (MTP)

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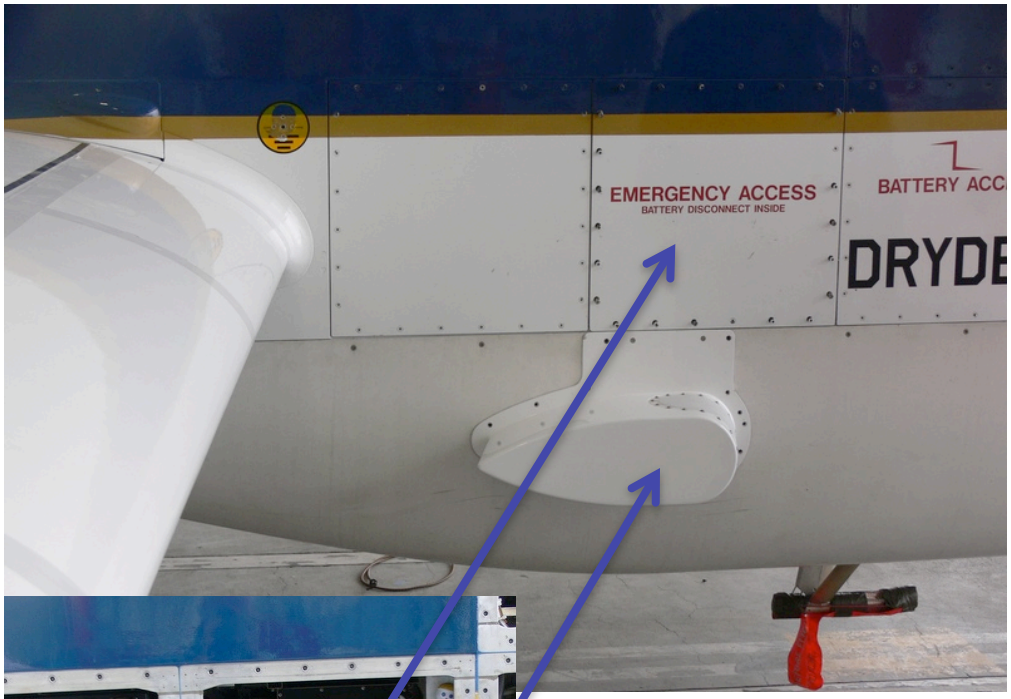

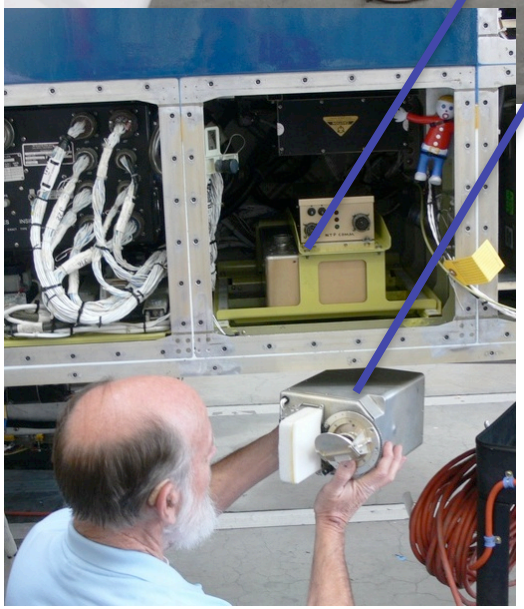

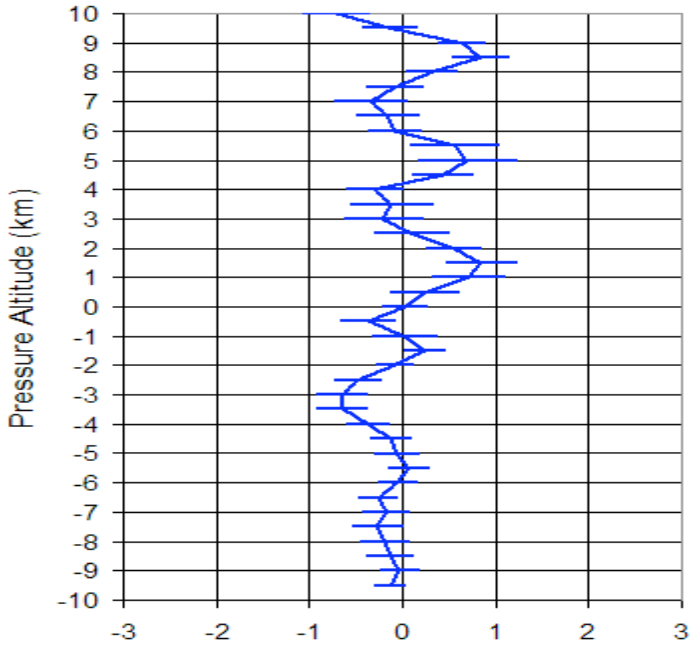

- Global Hawk used the same MTP as the ER-2, WB-57F, & Geophysica, but has new comm computer
- Temperature accuracy <1 K over profile in tropics
- Profile measured every 15 s.
- Vertical resolution 150 m near flight level, but degrades with distance from flight level
- Horizontal resolution ~2-3 km

MTP Realtime Display on GloPac

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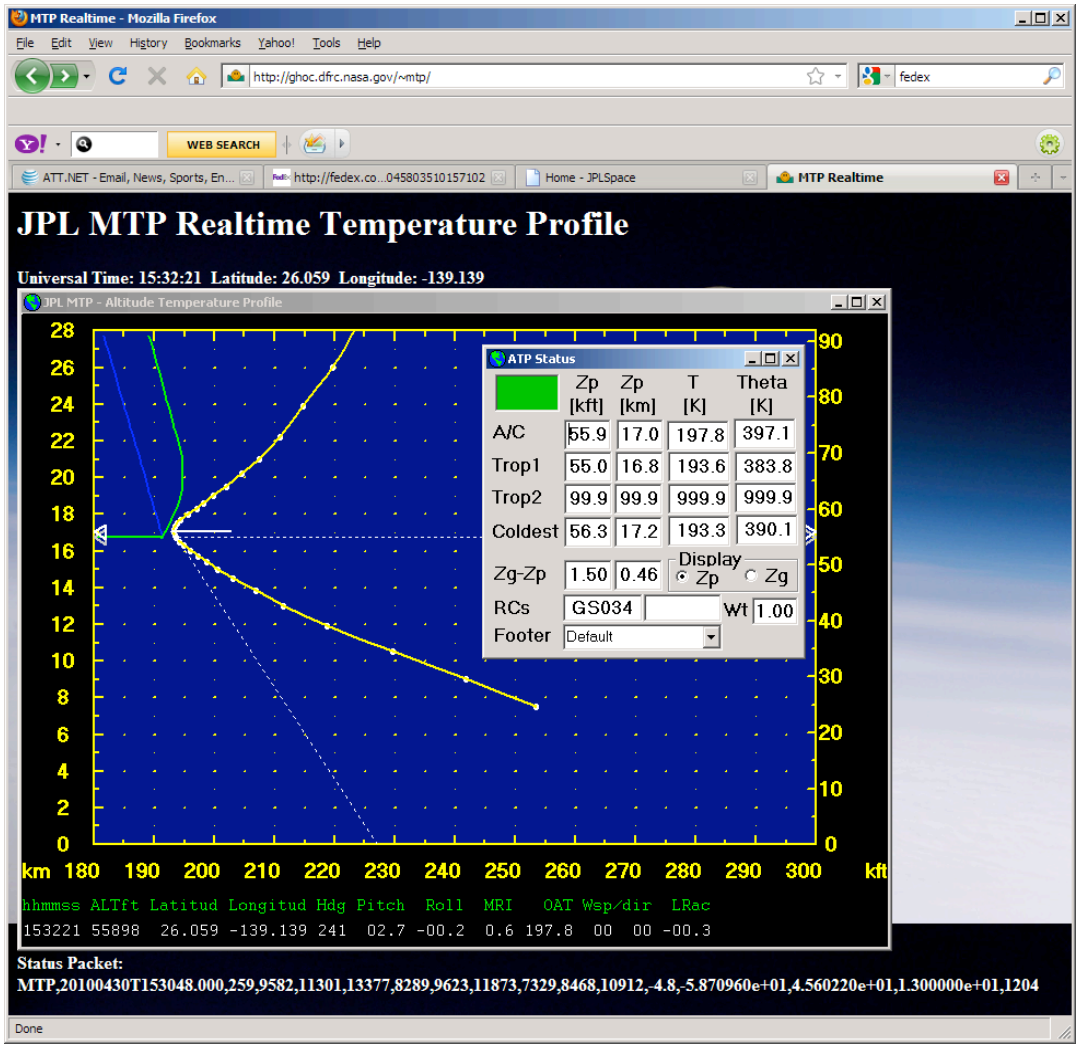

- Raw MTP data sent from instrument to ground via Iridium or Ku-band satellite
- Temperature profile retrievals were performed in real time and displayed on a public web page
- These temperature profiles and other data products can be used for real time flight planning

The MTP's Role on ATTREX

- TTL Thermal Structure

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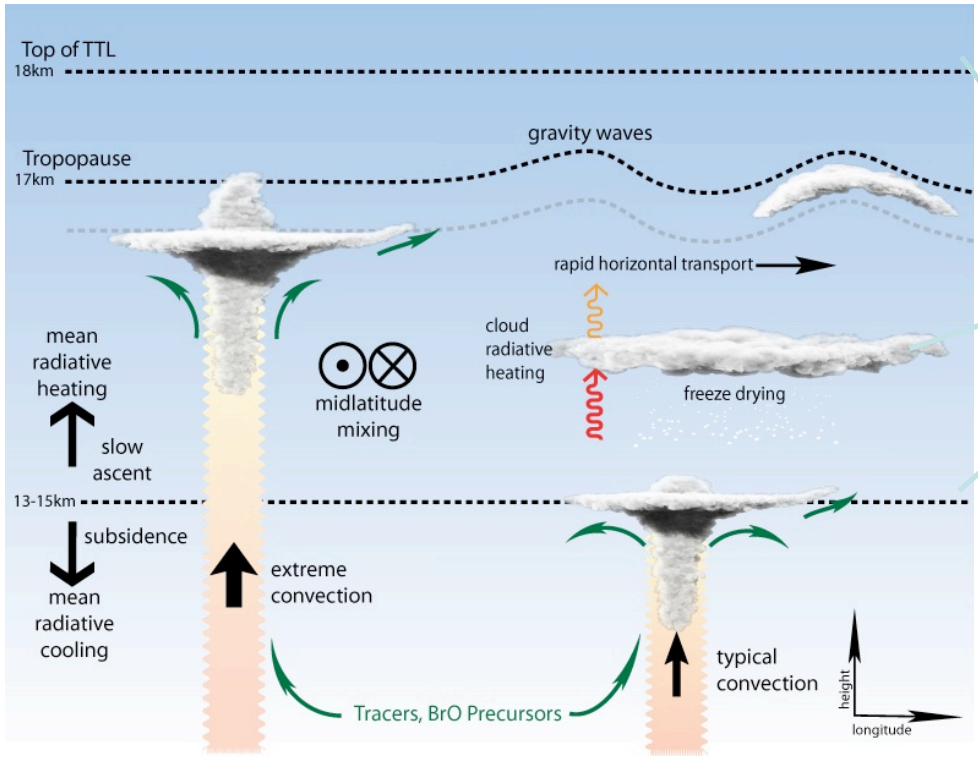
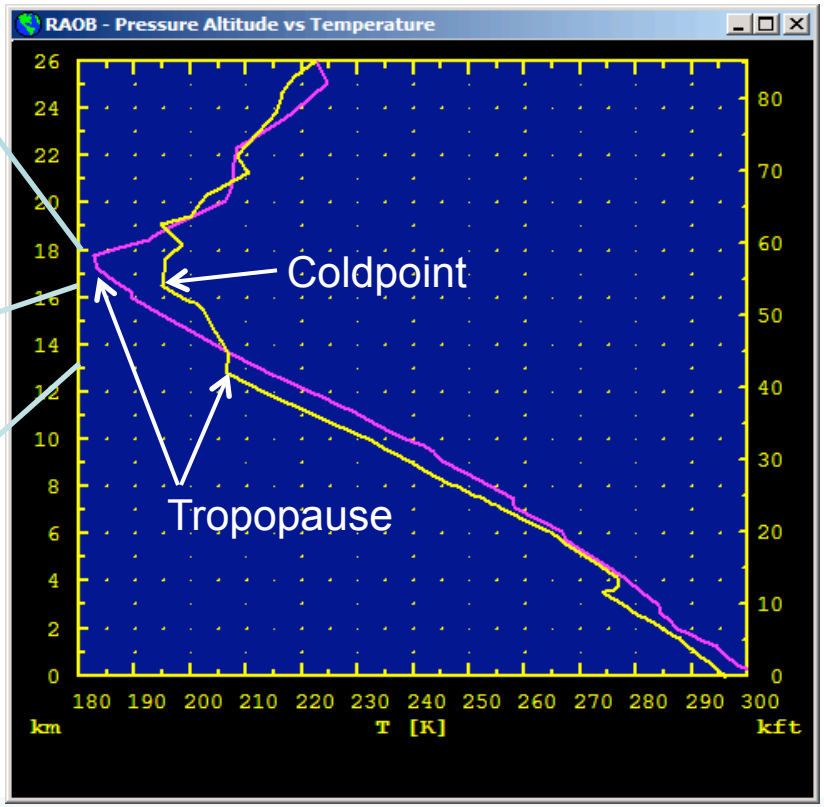
ATTREX Goal: How does the TTL control the composition of the stratosphere, especially H_20?



Schematic of the Tropical Tropopause Layer (TTL) from ~13-18 km. T-structure controls H_20 flow.



Soundings from Belize (17°N, yellow) and American Samoa (14°N, pink) Jan 11, 2009

- MTP-retrieved temperature profiles provide meteorological context for trace gas, aerosol & hydrometeor measurements made by other instruments.
- During ATTREX the MTP T-profiles will measure the thermal structure of the TTL.

The MTP's Role on ATTREX

- TTL Dynamics

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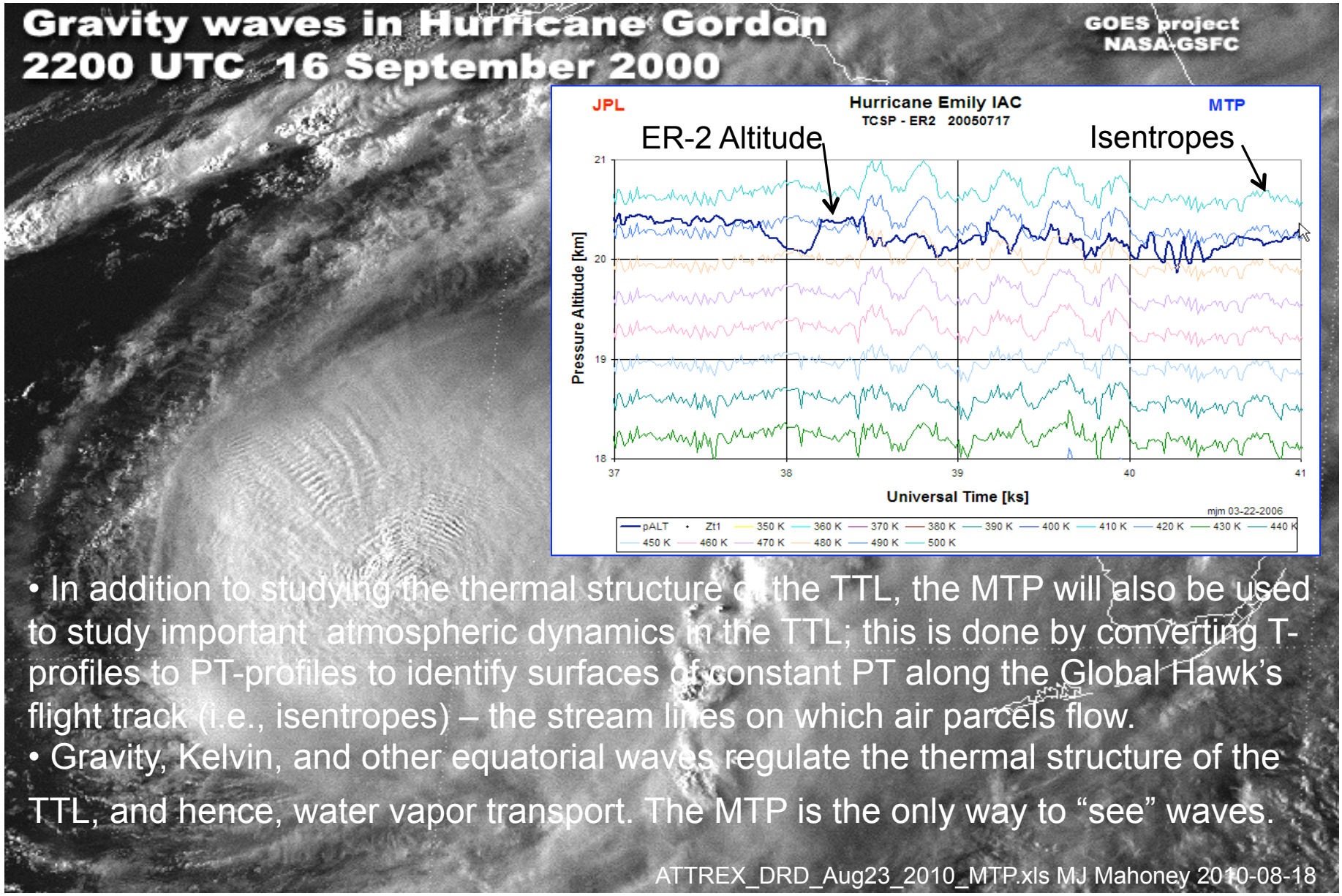

- In addition to studying the thermal structure of the TTL, the MTP will also be used to study important atmospheric dynamics in the TTL; this is done by converting T-profiles to PT-profiles to identify surfaces of constant PT along the Global Hawk's flight track (i.e., isentropes) – the stream lines on which air parcels flow.
- Gravity, Kelvin, and other equatorial waves regulate the thermal structure of the TTL, and hence, water vapor transport. The MTP is the only way to "see" waves.

Global Hawk and HIAPER MTPs

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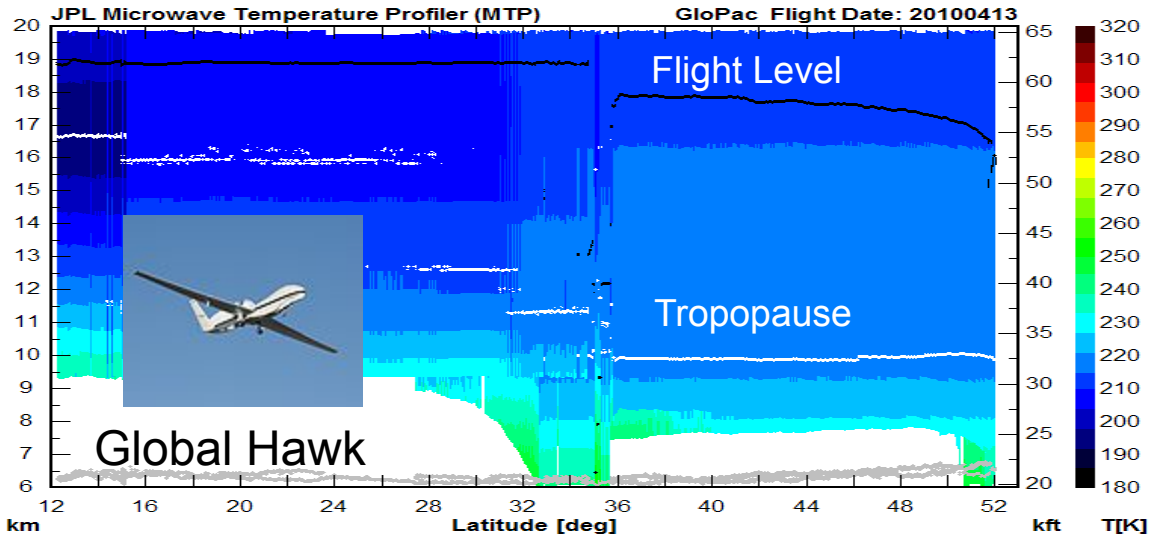
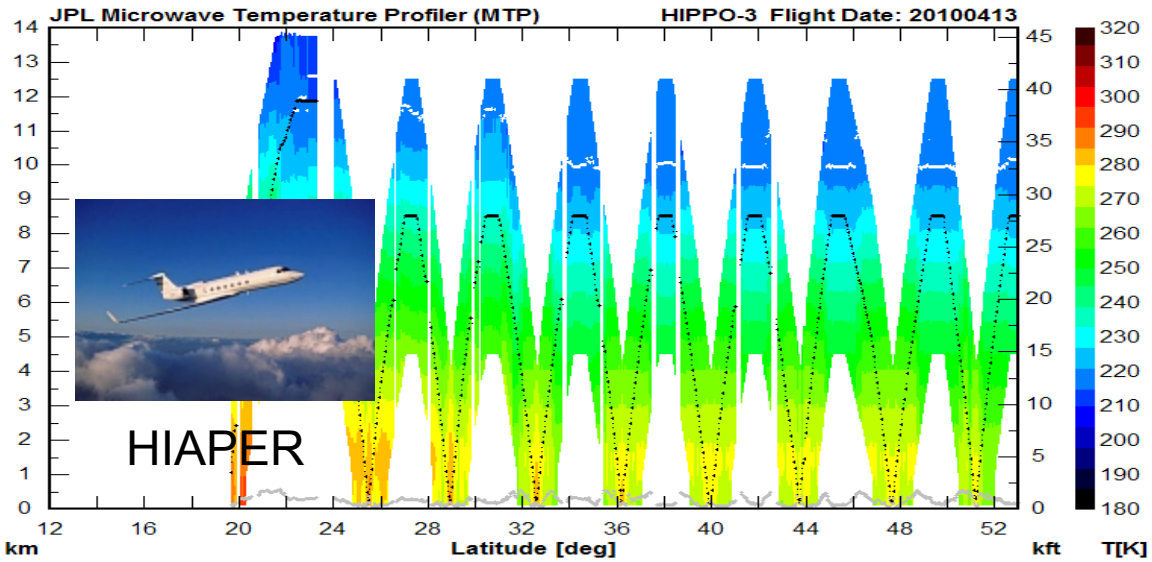
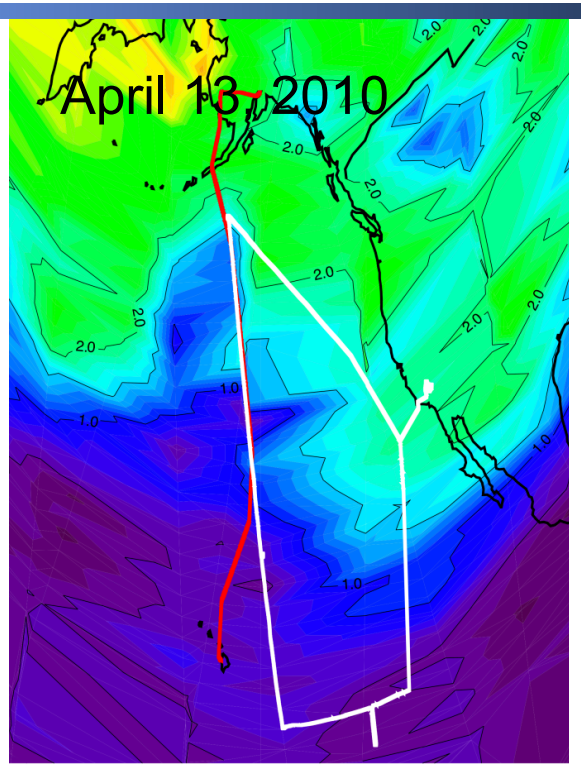




(Preliminary data)



MLS ozone figure courtesy of
Karen Rosenlof (NOAA)

- Global Hawk and HIAPER flew over-lapping flight track on 2010-04-13 along Aura ground track.
- This will allow inter-comparisons to be made.